

CLAIM LISTING FOR USSN 10/656,529

Claims 1-21 (cancelled)

- 1 22. (Previously presented) A method for operating a fuel cell system, the system
- 2 including a stack of PEM fuel cells including at least one cooler for carrying
- 3 antifreeze through the stack to remove heat, the fuel cell system further
- 4 including a water circulation system for accumulating water and circulating
- 5 that water through water flow passages passing through each cell, wherein, at
- 6 the time of start-up, the stack has frozen water therein and there is insufficient
- 7 liquid water within the water circulation system to enable the circulation of
- 8 water, the method for operating the fuel cell system including (a) starting up
- 9 and operating the frozen stack by introducing non-humidified reactants into
- 10 the cells and connecting a load across the stack to generate heat to increase the
- 11 stack temperature to above 0°C and thereby melt frozen water within the stack,
- 12 including accumulating liquid water during stack operation until there is
- 13 sufficient liquid water to enable circulation of liquid water through the cell
- 14 water flow passages, and thereafter circulating that water through the water
- 15 flow passages to provide humidification for the cells, and, (b) at a stack
- 16 operating temperature above 0° C, initiating and maintaining the circulation of
- 17 antifreeze through the stack cooler to prevent the operating temperature of the
- 18 stack from increasing beyond a preselected temperature during the period of
- 19 operation of the stack prior to said step of circulating the water, said
- 20 preselected temperature being selected to prevent the cells from drying out
- 21 during said period of operation, and (c) allowing the stack operating
- 22 temperature to increase above that preselected temperature after water
- 23 circulation through the water flow passages has begun, and (d) shutting down
- 24 the stack and, upon shutdown, draining liquid water from the cell water flow
- 25 passages before it freezes.
- 1 23. (Previously presented) The method according to claim 22, wherein the stack
- 2 operating temperature is allowed to increase to said preselected temperature
- 3 before antifreeze circulation is initiated, and the antifreeze circulation

4 maintains the stack operating temperature at said preselected temperature until
5 water circulation through the water flow passages has begun.

1 24. (Previously presented) The method according to claim 22, wherein the
2 preselected temperature is no more than about 40°C.

1 25. (Previously presented) The method according to claim 22, wherein the
2 preselected temperature is between 30°C and 40°C.

1 26. (Previously presented) The method according to claim 23, wherein said
2 preselected temperature is between 30°C and 40°C.

1 27. (Previously presented) The method according to claim 22, wherein the water
2 circulation system includes a water accumulator, wherein upon start-up of the
3 stack the accumulator has frozen water therein, and operation of the stack after
4 startup is used to melt frozen water within the accumulator.

Claims 28-30 (canceled)